

► TENNESSEE CONSOLIDATED RETIREMENT SYSTEM

Actuarial Funding Valuation – Legacy Pension Plans
Valuation Date: June 30, 2018

November 30, 2018

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► Valuation Purpose

- Determine employer contribution rates for Legacy Pension Plans
(TCA Section 8-37 Part 3)
 - Valuation Date: 6/30/2018
 - New Employer Rates Effective: 7/1/2019
- Examine financial health of plan
- Separate process and reporting for GASB 67/68

► Valuation Background

- Experience Study
 - Mandated by statute
 - Most recent study reviewed 2012 - 2016 period
 - New assumptions adopted (applied to 6/30/2017 valuation)
 - Performed every 4 years
 - Next study will review 2016 – 2020 period
- Actuarial Audit
 - Commonly done for public plans
 - Last audit performed in 2010
 - Endorsed methodology and results
 - Performed every 10 years

► System Overview – Legacy Plans (as of June 30, 2018)

- Defined Benefit System
 - State employees, higher education and K-12 teachers hired prior to July 1, 2014
 - 595+ local governments (participation is optional and costs are valued individually)
- Demographic Data
 - 181,000 Active Participants
 - 157,000 Retired Participants (\$2.6 Billion in annual payments)
- Market Value of Assets -- \$49.3 Billion
- Funding Basis is Traditionally Conservative

► System Overview – Plan Design

| | Legacy Plan | Hybrid Plan* |
|--------------------------------|-----------------|------------------------------------|
| Benefit Multiplier | 1.575% | 1.0% |
| Full Retirement | Age 60/30 YOS | Age 65/Rule of 90 |
| Early Retirement | Age 55/25 YOS | Age 60/Rule of 80 |
| Employee Contributions | State-0%;TCH-5% | State-5%;TCH-5% |
| Cost of Living Adjustment | CPI (Max 3%) | CPI (Max 3%) |
| Defined Contribution Component | None | 5% From Employer |
| Stabilization Reserve | None | Yes |
| Cost Controls | None | 9% Employer Target |
| Unfunded Liability Controls | None | Limit: 12.5% of State Indebtedness |

*New Hybrid Plan effective only for new hires after 7/1/2014

► System Overview – Plan Design

- Hybrid Plan began 7/1/2014 with new employees only
- All employees hired prior to 7/1/2014 continue in Legacy Plans
- Cost savings of Hybrid Plan will be gradual over time
- Legacy Plans must still be managed and funded adequately
- Remainder of presentation related to Legacy Plans

► Active Membership Comparison by Number (Legacy Plans)

| Group | 2017 | 2018 | Pct Change |
|---------------|---------|---------|------------|
| Teachers | 62,320 | 59,487 | (4.5)% |
| State | 43,080 | 39,867 | (7.5) |
| Political Sub | 79,819 | 80,429 | 0.8 |
| Others | 792 | 748 | (5.6) |
| Total | 186,011 | 180,531 | (2.9)% |

Active Membership Comparison by Compensation (Legacy Plans)

| Group | 2017 | 2018 | Pct Change |
|----------------|-----------------|-----------------|-------------|
| Teachers | \$3,414,741,059 | \$3,460,664,012 | 1.3% |
| Average | 54,794 | 58,175 | 6.2 |
| State | 2,152,083,926 | 2,123,748,748 | (1.3) |
| Average | 49,956 | 53,271 | 6.6 |
| Political Sub | 2,741,394,464 | 2,832,351,234 | 3.3 |
| Average | 34,345 | 35,216 | 2.5 |
| Others | 87,389,035 | 85,756,641 | (1.9) |
| Average | 110,340 | 114,648 | 3.9 |
| Total | \$8,395,608,484 | \$8,502,520,635 | 1.3% |
| Average | \$45,135 | \$47,097 | 4.3% |

▶ Retired Member Comparison by Number (Legacy Plans)

| Group | 2017 | 2018 | Pct Change |
|---------------|---------|---------|------------|
| Teachers | 50,230 | 50,922 | 1.4% |
| State | 53,177 | 54,670 | 2.8 |
| Political Sub | 46,621 | 48,363 | 3.7 |
| Others | 3,477 | 3,408 | (2.0) |
| Total | 153,505 | 157,363 | 2.5% |

Retired Member Comparison by Benefit Amount (Legacy Plans)

| Group | 2017 | 2018 | Pct Change |
|---------------|-----------------|-----------------|-------------|
| Teachers | \$1,187,624,014 | \$1,227,138,816 | 3.3% |
| Average | 23,644 | 24,098 | 1.9 |
| State | 812,320,001 | 852,879,726 | 5.0 |
| Average | 15,276 | 15,601 | 2.1 |
| Political Sub | 376,190,301 | 402,010,661 | 6.9 |
| Average | 8,069 | 8,312 | 3.0 |
| Others | 97,619,260 | 98,296,740 | 0.7 |
| Average | 28,076 | 28,843 | 2.7 |
| Total | \$2,473,753,576 | \$2,580,325,943 | 4.3% |
| Average | \$16,115 | \$16,397 | 1.7% |

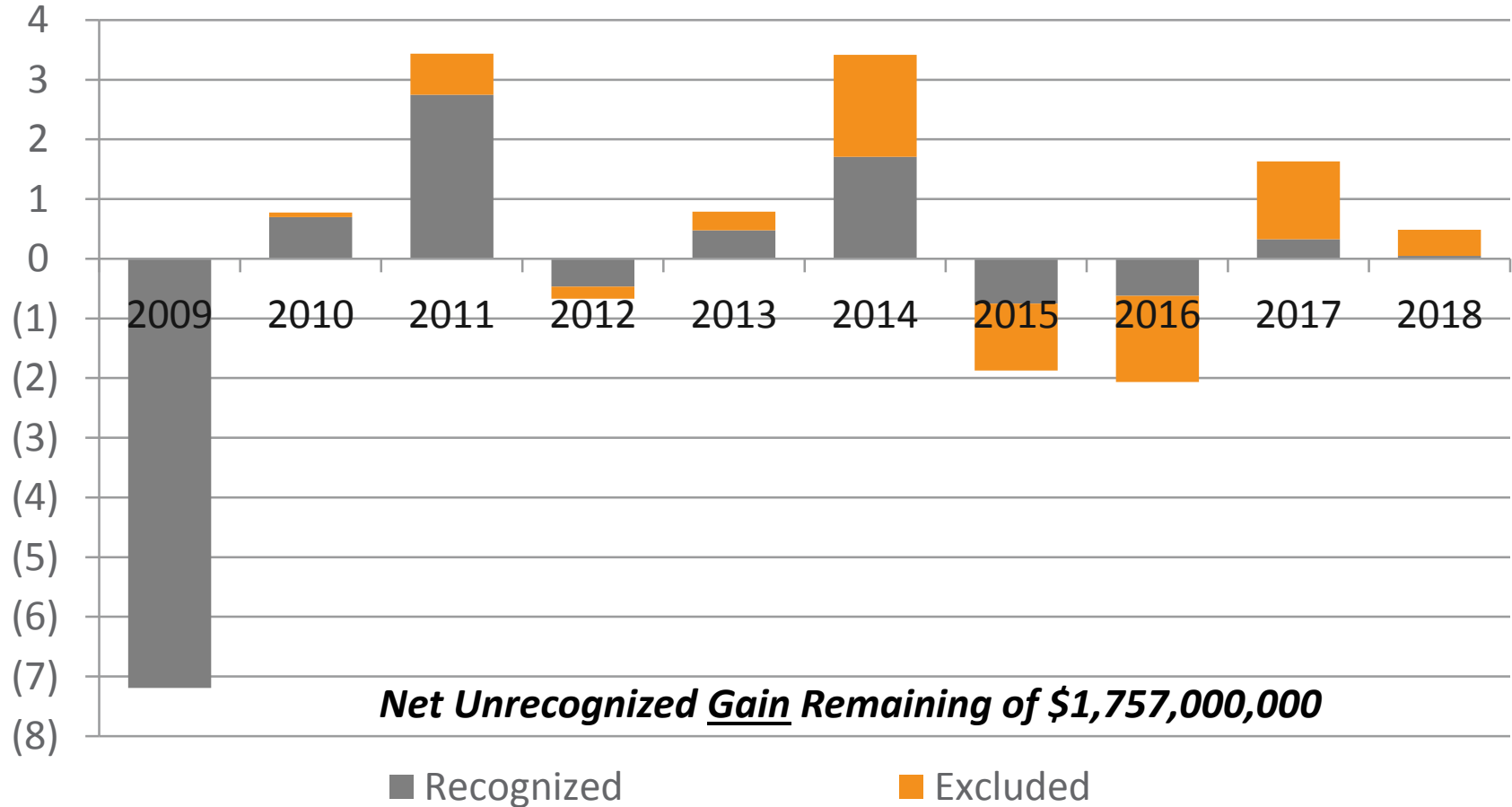
► Valuation Asset Method

- Use “smoothing” device to limit contribution volatility
- Phase-in excess or deficit earnings compared to the earnings assumption ratably over ten-year period
- Utilize 80%/120% corridor
- Resulting value is “Actuarial Value of Assets”
- Actuarial Value of Assets is only used to determine contribution rates pursuant to the TCRS funding policy (Market Value of Assets used for GASB reporting)

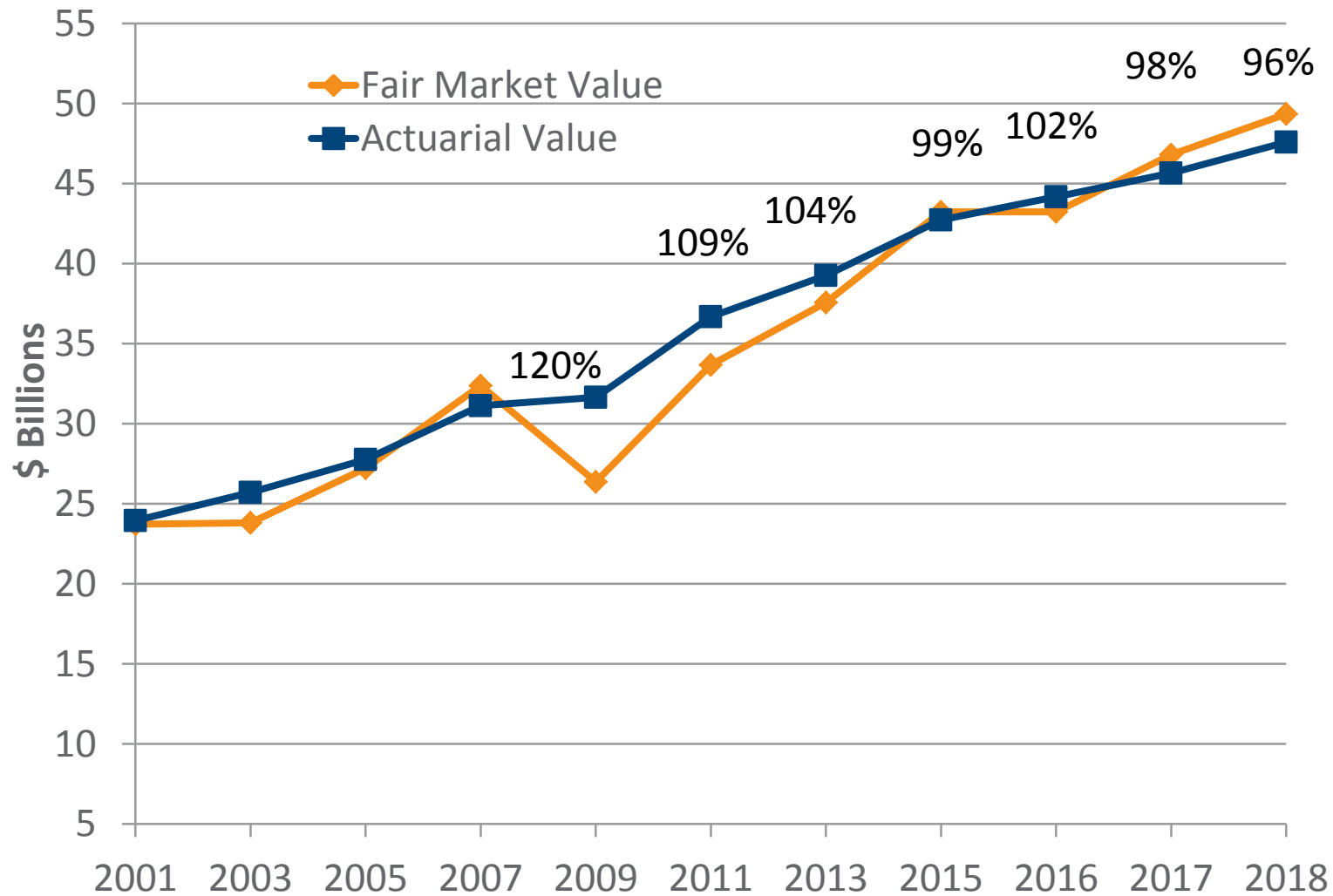
Valuation Asset Gains and Losses (Legacy Plans)

Return: -15.3% 10.2% 19.6% 5.6% 9.9% 16.7% 3.3% 2.8% 11.4% 8.2%

\$ Billions



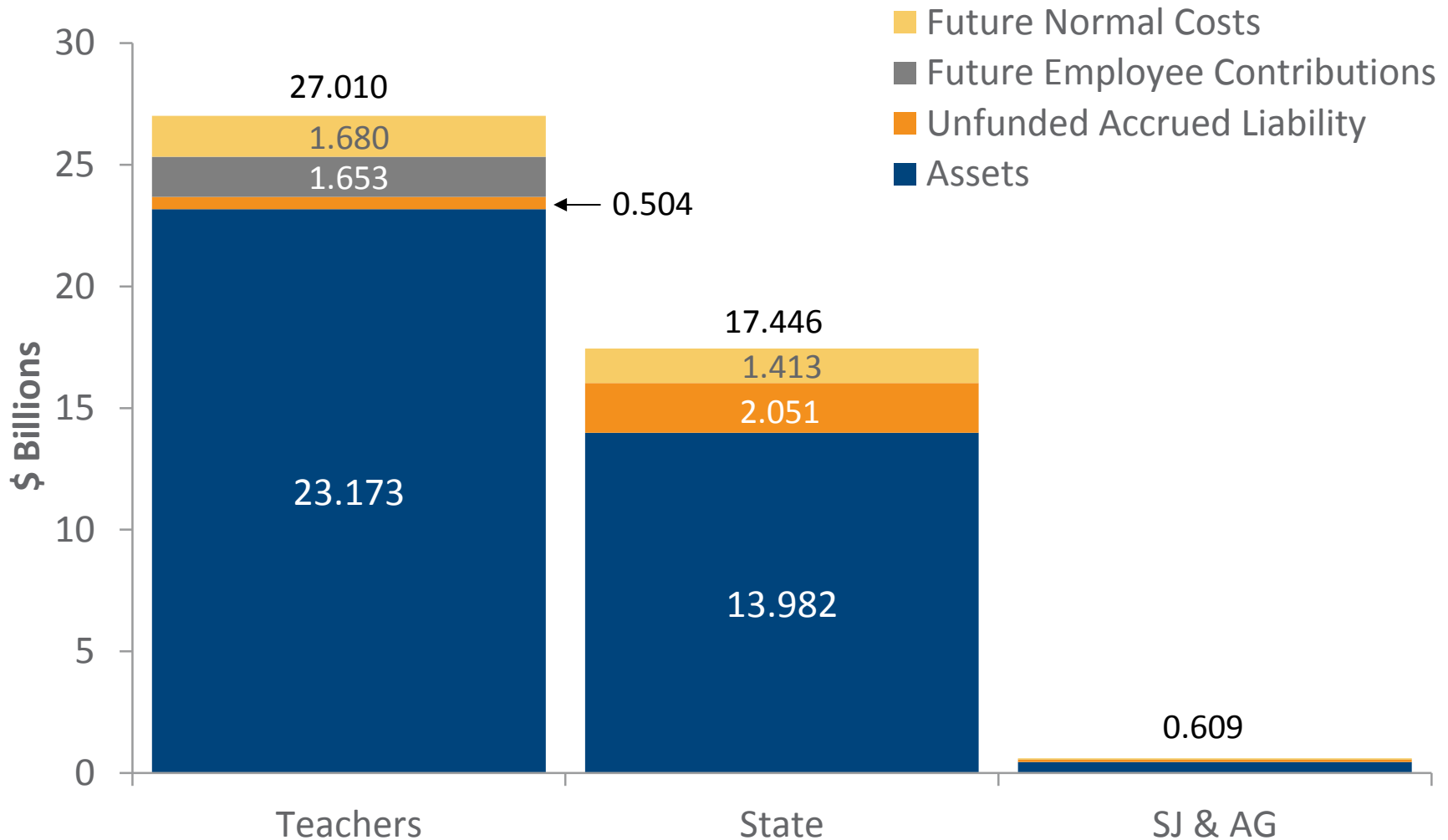
Valuation Asset Comparison to Market (Legacy Plans)



► Contribution Rate Determination

- Entry Age Normal funding method
- Normal Cost + Amortization of Unfunded Accrued Liability (UAL) + Administrative Fee
- Level dollar amortization of Unfunded Accrued Liability
- Amortization periods adjusted each year to manage rate changes and are within requirements of state law and pursuant to TCRS funding policy
- Local governments will be allowed to amortize the UAL pursuant to the TCRS funding policy

Present Value of Benefits – Legacy Plans (June 30, 2018)



Unfunded Accrued Liability (UAL) – Legacy Plans **(Based on Actuarial Value of Assets)**

| | 2017 UAL | 2017 Funded Ratio | 2018 UAL | 2018 Funded Ratio |
|---------------------------------------|-----------------|-------------------------|-----------------|-------------------------|
| Consolidated State | \$2,048,292,230 | 86.8% | \$2,051,029,991 | 87.2% |
| State Judges and Attorneys General | 107,971,017 | 80.1% | 97,654,474 | 82.4% |
| Total State | \$2,156,263,247 | 86.6% | \$2,148,684,465 | 87.1% |
| Contributory Teachers | 510,205,267 | 97.8% | 503,884,213 | 97.9% |
| Total | \$2,666,468,514 | 93.2% | \$2,652,568,678 | 93.4% |

The results for the Political Subdivisions are in progress and will be provided at a later date.

► Amortization of Unfunded Accrued Liability (UAL)

- New layer of UAL created with each valuation
- Effective Amortization Period for total UAL (in years)

| | <u>2017</u> | <u>2018</u> |
|-------------|-------------|-------------|
| Teachers | 3.38 | 3.08 |
| State | 13.64 | 12.85 |
| Judges & AG | 12.88 | 11.00 |

- Amortization periods are lower than many other states
- Full detail of amortization schedule by layer on following page

Amortization of Unfunded Accrued Liability (UAL) (Detailed Schedule of Periods)

Amortization periods for UAL – as of June 30, 2018

| | Teachers | State | Judges & AG |
|--------------------|----------|-------|-------------|
| UAL Layer 1 (2013) | 1.72 | 9.70 | 10.33 |
| UAL Layer 2 (2015) | 17.00 | 17.00 | 17.00 |
| UAL Layer 3 (2016) | 18.00 | 18.00 | 18.00 |
| UAL Layer 4 (2017) | 19.00 | 19.00 | 19.00 |
| UAL Layer 5 (2018) | 20.00 | 20.00 | 20.00 |

► Contribution Rate Summary – Percent of Payroll (Legacy Plans – Employer Rate)

| | <u>2017</u> | <u>2018</u> |
|----------------------------|-------------|-------------|
| Contributory Teachers | 10.46% | 10.63% |
| Consolidated State* | 19.36% | 19.80% |
| State Judges and Attorneys | 25.55% | 25.55% |
| General | | |

*The Consolidated State contribution rate includes the costs attributable to bridge and service retirement benefits for public safety officers. In practice, a separate contribution rate is determined for General Employees and Public Safety Officers.

► Contribution Rate Summary – Projected Contribution (Legacy Plans – Employer Rate)

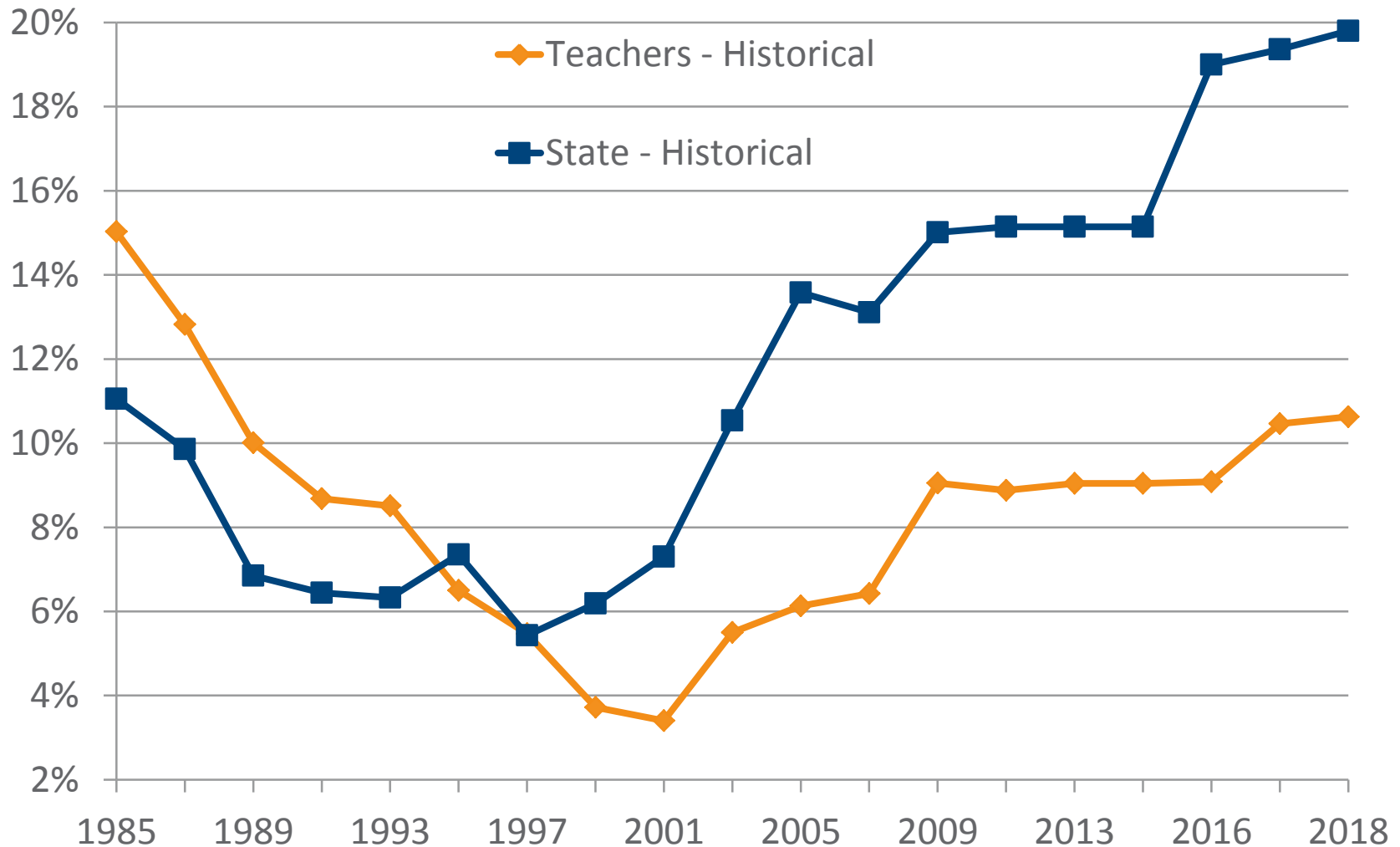
| | 2017 | 2018 |
|---------------------------------------|---------------|---------------|
| Contributory Teachers | \$357,181,915 | \$367,868,584 |
| Consolidated State* | \$418,111,682 | \$421,743,023 |
| State Judges and Attorneys General | \$20,276,939 | \$20,215,382 |

*The Consolidated State contribution rate includes the costs attributable to bridge and service retirement benefits for public safety officers. In practice, a separate contribution rate is determined for General Employees and Public Safety Officers.

► Employer Contribution Rate Reconciliation (Legacy Plans)

| | Teachers | State |
|--|---------------|---------------|
| 2017 Employer Contribution Rate | 10.46% | 19.36% |
| Asset Experience | 0.06 | 0.04 |
| Salary Experience | 0.25 | 0.05 |
| Cost of Living Escalation | (0.06) | (0.06) |
| Prior Service Purchases (estimate) | 0.10 | 0.10 |
| Turnover Impact on Total Payroll | 0.03 | 0.32 |
| Delay in Contribution Rate Change | 0.13 | 0.03 |
| Update Mortality Projection | (0.15) | (0.19) |
| Other Experience and Census Changes | (0.19) | 0.15 |
| Re-amortization of UAL | 0.00 | 0.00 |
| 2018 Employer Contribution Rate | 10.63% | 19.80% |

Employer Contribution Rate History (Legacy Plans)

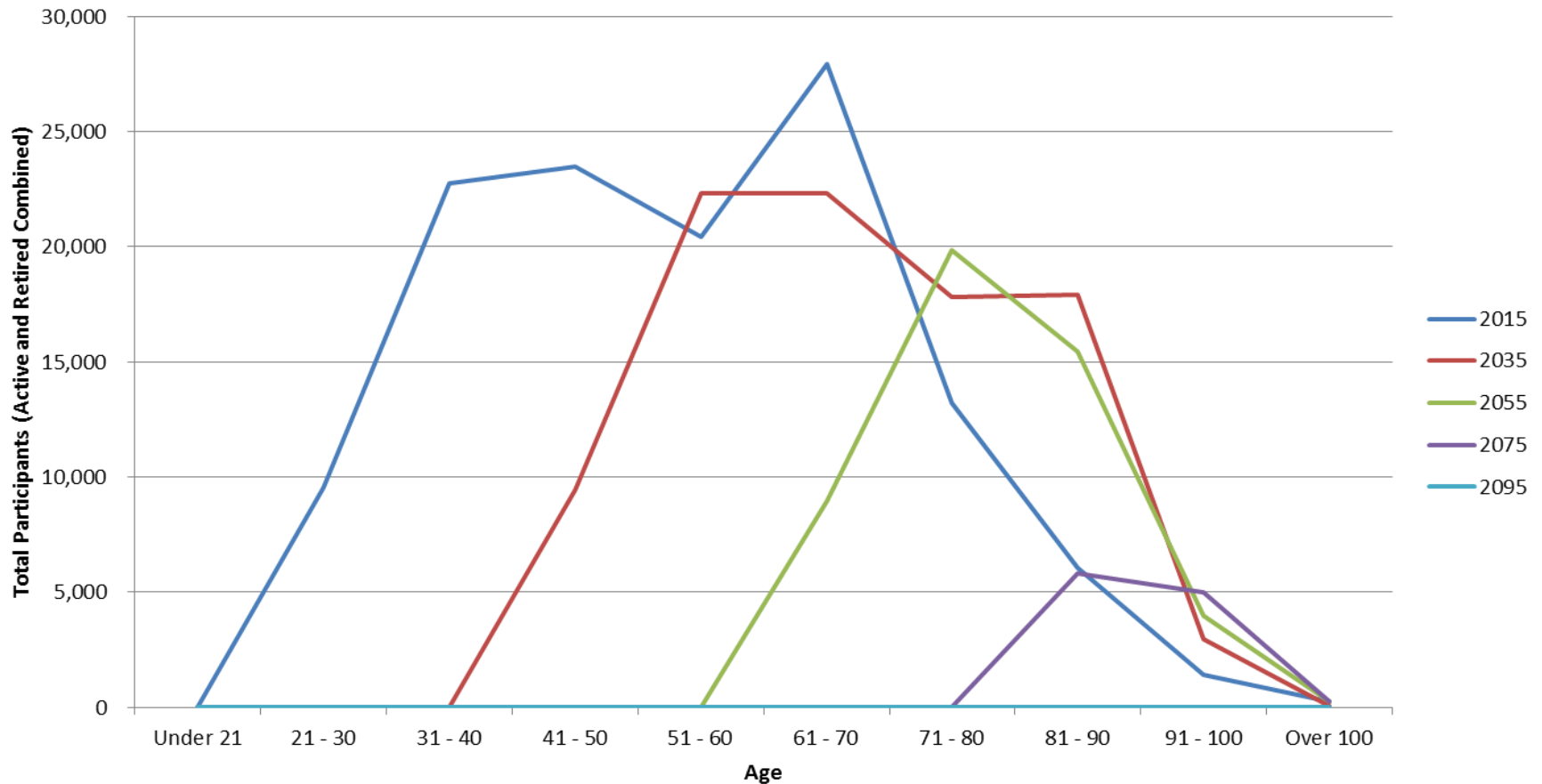


► Future Considerations and Potential Challenges

- Closed Plan (no new hires enter the plan)
 - Total payroll base used to determine contribution % will decrease
 - Level \$ UAL amortization payments will grow as a % of payroll
- Recognition of prior investment gains and losses
- Contribution rate and funded status volatility risk
 - Investment returns after June 30, 2018
 - Mortality improvements/salary growth/COLA

Legacy Teacher Participants by Age

TCRS Legacy Plan - Teacher
(80-Year Participant Age Band Projection)



Total Participants By Year:

2015: 125,106

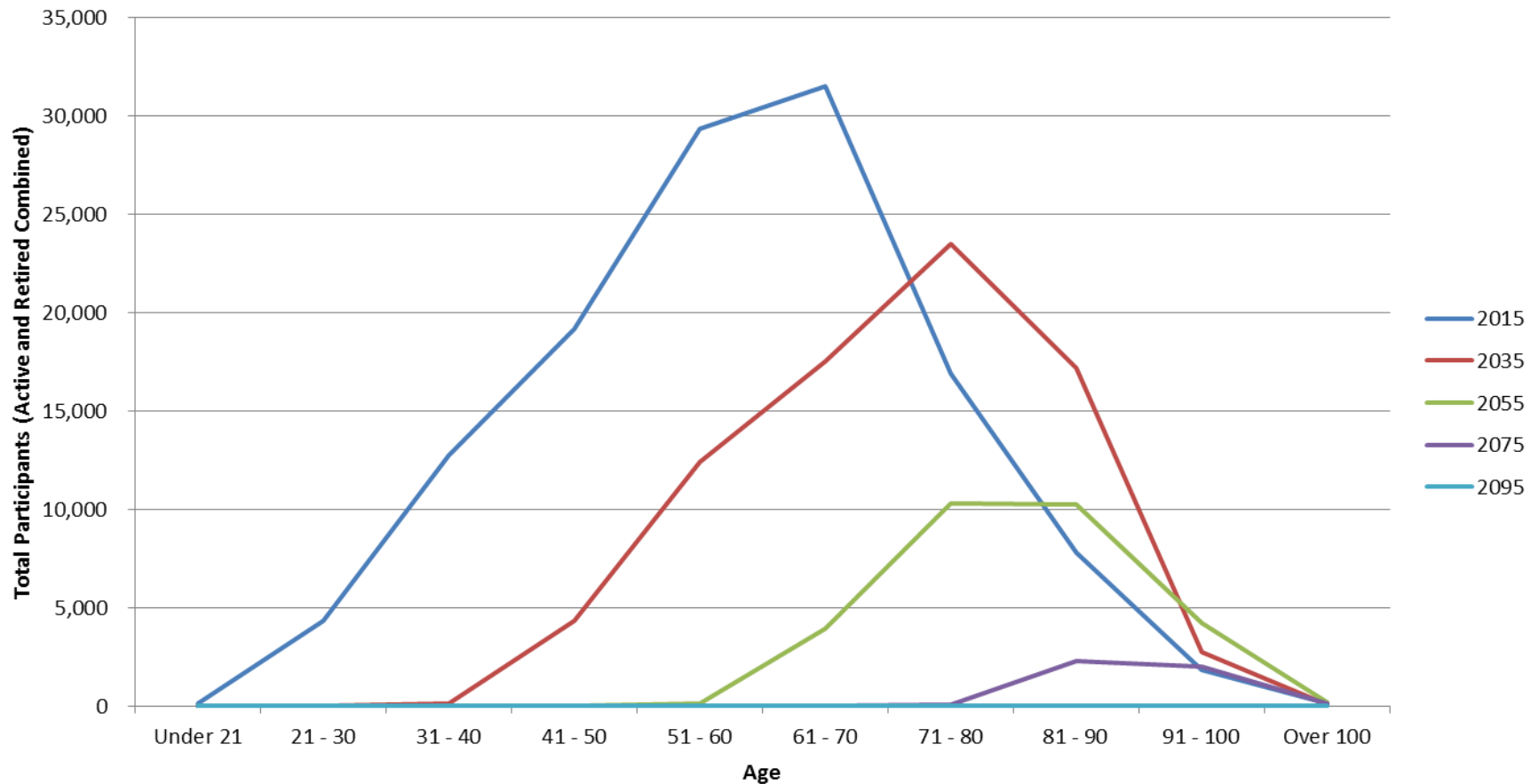
2035: 92,832

2055: 48,534

2075: 11,058

Legacy State Participants by Age

TCRS Legacy Plan - State
(80-Year Participant Age Band Projection)



Total Participants By Year:

2015: 123,861

2035: 77,798

2055: 29,042

2075: 4,515

► Certification

This report has been prepared exclusively for TCRS to provide Legacy Plan employer contribution rates. Census data, plan provisions, and actuarial assumptions and methods will be documented in the TCRS actuarial valuation funding report as of June 30, 2018. Findley is not responsible for consequences resulting from the use of any part of this report without prior authorization and approval. Determinations for other purposes may be different from the results shown in this report. This report provides actuarial advice and does not constitute legal, accounting, tax, or investment advice. This report has been prepared under the supervision of Justin C. Thacker, a member of the American Academy of Actuaries, a Fellow of the Society of Actuaries, and a consulting actuary with Findley of Brentwood, Tennessee, who has met the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions herein. To the best of our knowledge this report has been prepared in accordance with generally accepted actuarial standards, including the overall appropriateness of the analysis, assumptions, and results and conforms to appropriate Standards of Practice as promulgated from time to time by the Actuarial Standards Board, which standards form the basis for the actuarial report. We are not aware of any direct or material indirect financial interest or relationship that could create, or appear to create, a conflict of interest that would impair the objectivity of our work.



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November 30, 2018

Date